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¶1. (SBU) SUMMARY: This cable reports on Ghana,s current civilian uses of atomic technology and their plans to become a nuclear power producer (response to REF A). Ghanaian atomic science research is established institutionally, but at a low level of technical sophistication. Ghana,s atomic science officials highlight Ghana,s close cooperation with the International Atomic Energy Agency (IAEA) and their membership status in GNEP. In their nascent bid to become a nuclear power producer, the Ghana Atomic Energy Commission indicated a clear preference for U.S. nuclear technology. Post,s assessment is that Ghana,s technological needs and favorable disposition toward the United States create opportunities for USG atomic energy and safety programming, broader U.S.-Ghana science and technology cooperation, and commercial prospects for U.S. producers of civilian nuclear technology. However, the likelihood of Ghana accomplishing its stated goal to become a nuclear power producer by 2018 is unlikely, due to uncertain future political support and a questionable underlying economic rationale. END SUMMARY.

Atomic and Nuclear Science Programs

¶2. (U) Ghana,s flagship facility is the Ghana Atomic Energy Commission,s (GAEC) small scale 30KW Chinese-origin miniature neutron source reactor (MNSR), a copy of the Canadian SLOWPOKE reactor design. Dubbed the Ghana Research Reactor-1 (GHARR-1), it uses highly enriched 90.2 percent Uranium 235. (NOTE: China has supplied these reactors, said to be least expensive research reactor, to a number of countries: Iran, Syria, Pakistan, Nigeria and Ghana. END NOTE.) Commissioned in 1996, the reactor,s fuel source is nearing the end of its expected 15-year life cycle. In a meeting with econoffs, Dr. Edward Akaho, Director General of GAEC, indicated that within the next two years they seek to replace the GHARR-1 current fuel with a low-enriched source, under the DOE/Argonne National Laboratory,s Reduced Enrichment for Research and Test Reactors (RERTR) program. GHARR-1 is used for teaching purposes and also for Neutron Activation Analysis (NAA) for product and industrial testing.

¶3. (U) Ghana also has a Gamma Irradiator with a 12-year old Cobalt-64 source that has reportedly weakened from 50 to 7 kilojoules of output. Accordingly, the GAEC has worked through the IAEA to procure a new cobalt source from Hungary. The irradiator is used primarily for food preservation. Other uses include medical sterilization, tissue culture research, and also an experimental project for the mass sterilization of mosquitoes. Ghana also has two radiological sources currently being used in medical facilities, and they are seeking a third nuclear medicine device.

¶4. (SBU) To augment its teaching and testing capabilities, Ghana seeks to acquire a Ion-Beam Analysis (IBA) accelerator. Working with the IAEA, GAEC identified a 2MV system initially priced at USD 1.5 million. However, the system price has now risen to approximately USD 2.3 million. The Government of Ghana (GOG) has allocated USD 500,000 for the system, and are in need of donor contributions from IAEA members for the remainder. Soliciting USG contributions, the GAEC stated that the civil works to house the facility are 80 percent complete, and that the IBA accelerator will be used not only for research, but applied in fields as varied as agriculture, life sciences, industrial testing, and archeology.

Nuclear Power Program: Phase 2, Possibly

¶5. (SBU) The outgoing government in Ghana has made a policy decision to pursue nuclear energy; it has set the ambitious target of 2018 for commissioning its first nuclear power plant. According to the IAEA,s three phase schema for development of nuclear power this public announcement suggests that Ghana has crossed Milestone 1: "Ready to make a knowledgeable commitment to a nuclear program." (NOTE: IAEA Nuclear Energy Series No. NG-G-3.1 is frequently cited in discussions and likely guides the GAEC in its policy approach to developing nuclear power.) Thus, Ghana,s energy officials may perceive themselves to be crossing into Phase 2: "preparatory work for the construction of a nuclear power plant after a policy decision been taken."

¶6. (SBU) While proudly describing apparent progress toward their ambition of delivering nuclear energy to Ghana, the GAEC officials tacitly acknowledged that the policy decision to pursue nuclear power was taken at effectively the end of an outgoing administration.

The GAEC leadership anticipates that if the opposition (National Democratic Congress) takes the Presidency in the run-off election, the commitment to pursue nuclear power could be revisited by the next government (NOTE: Following the first round of elections, the opposition is already positioned to control Ghana,s Parliament. Thus it is near certain that the outgoing government,s nuclear policy and plans will be critically reviewed by the incoming parliament. END NOTE) The GAEC characterized this scenario as likely to require starting from scratch with extensive discussions and "education" with the new leadership, i.e. a return back to Phase 1: "Considerations before a decision to launch a nuclear power programme is taken." (See para 19 below.)

¶7. (U) As part of its Phase 2 activities, the current government has drafted a bill to create a Ghana Nuclear Regulatory Authority distinct from the GAEC. The specific inspection/enforcement powers of the

proposed regulatory authority are still at the draft stage. The draft bill addresses issues of domestic nuclear liability, and would bring Ghana into compliance with the Vienna Convention on Civil Liability for Nuclear Damage.

¶8. (SBU) The GAEC does not as an institution exercise final authority on the proposed nuclear energy policy. However, its key leaders in their individual capacity are likely being tapped for input and participation in other bodies. Ghana,s Energy Commission is broadly responsible for planning and assessing Ghana,s potential energy opportunities within which nuclear power is one element. A proposed ad hoc body is the "Presidential Commission on Nuclear Energy" for developing Ghana,s Nuclear Power Policy. This Commission would have a subordinate "Committee for Technology Assessment" that would be charged to identify and assess the suitability of specific technologies. (The GAEC indicated that the IAEA has committed to provide support to this body.) As Ghana,s lead nuclear experts, the GAEC,s scientists would likely have key roles in these entities.

¶9. (SBU) When asked about financing scenarios, the GAEC indicated that financial and taxation details would be dependent on the ultimate nuclear technology supplier and the associated financial terms offered. They anticipate that ultimately development would be a public-private venture, with private (or supplier country) participation along with a Government of Ghana position.

¶10. (SBU) Claiming that Ghana,s geologic profile is similar to Brazil, the GAEC described the potential for uranium mining in Ghana. While expressing vehement disinterest in enrichment activities, they suggested that production of yellow-cake would be a possibility.

Domestic Capabilities: Nascent at Best

¶11. (SBU) Ghana,s economy is defined by agriculture and extractive industries. By international standards, Ghana,s manufacturing base is underdeveloped. By regional standards, Ghana,s relative stability and prosperity mask its fundamental lack of economic diversification and low levels of manufacturing (beyond some agricultural processing.) Ghana has a nascent IT services sector, but no high-tech components or heavy industry involved in nuclear technology or services. COMMENT: While the GAEC

emphasizes its interest in local sourcing and local hiring, it is unlikely that this position is anything more than a desire to create a demand for its domestic atomic-trained scientists and technicians and to support the GAEC,s own workshops (or otherwise create an incentive structure to expand its workshop/production resources). END COMMENT.

¶12. (SBU) Ghana,s nuclear-trained workforce is of an unknown size, and likely limited to persons with a scientific background, without significant applied skills. Ghana lacks a significant engineering and technical talent base that could be readily converted into a large nuclear workforce. However, given their modest initial goals, it is unlikely that an especially large number of trainees beyond local Ghanaians with extant raw potential would be required. The development of civil nuclear power would most likely require skilled foreign workers.

¶13. (U) Ghana,s current graduate-level nuclear science teaching activities at the School of Nuclear and Allied Sciences (SNAS, a collaboration between the GAEC and the University of Ghana) includes the following specializations: applied nuclear physics, nuclear and environmental protection, nuclear engineering, nuclear agriculture, nuclear and radiochemistry, radiation protection, radiation processing, medical physics, computational nuclear sciences and engineering, and nuclear earth sciences. There are approximately 30-40 students in each M.Phil program class year, spread across these specializations. At the PhD level, Ghana has a total of 14 nuclear science students. The nuclear science faculty has approximately 38 permanent senior members.

Opportunities for U.S. Industry

¶14. (SBU) Given its stated status as seeking nuclear energy, the full range of nuclear sector opportunities potentially exist for U.S. industry in Ghana, including: feasibility studies, consulting services, plant construction management, reactor sales, fuel cycle service provision, plant operations, waste management, and logistics.

¶15. (SBU) At this stage no private companies have formally initiated discussions with Ghana. However, GAEC,s Director General explicitly articulated to econoffs his strong interest in Westinghouse,s AP600 and AP1000 nuclear plant designs.

¶16. (SBU) Prior to specifically mentioning the cited U.S. nuclear technologies, the GAEC expressed a number of general preferences that would guide them in their assessment of potential suppliers. First, they are seeking tested, reliable and safe nuclear technology. Second, they seek to maximize technology transfer provisions and utilization of local inputs and labor. In terms of scope, they would seek phased development, starting with an initial reactor output not exceed 10 to 15 percent of the grid, to then scale up with additional reactors. Ghana explicitly does not wish to be responsible for the fuel cycle: they would seek for any supply agreement to include provisions for the return of spent fuel. Finally, the GAEC expressed a strong preference for initial development under a bilateral nuclear cooperation program. After their

nuclear program matured they suggested that multilateral cooperation agreements could be possible.

Foreign Competitors

¶17. (SBU) The GAEC,s Director General, Dr. Edward Akaho noted that soon after the public announcement of Ghana,s plan to pursue nuclear power, he was visited by the Russian Economic Attache, who presented them with product brochures. Dr. Akaho and his colleagues noted that the Russian diplomat did not engage in much substantive dialogue with them. In a separate line of discussion, Dr. Akaho noted that even through he was trained in the UK, he did not especially like British nuclear technology.

¶18. (SBU) Stressing that they work primarily through the IAEA, the GAEC officials did not state the existence of any formal agreements relating to nuclear cooperation, commerce, or technical exchanges with any other countries -- other than GNEP (NOTE: econoff cannot be sure this was a definitive statement, or avoiding the question. END NOTE.). When queried about the procurement of a radiological source from Hungary, the GAEC noted the procurement (like that of GHARR-1) was accomplished through IAEA mechanisms.

¶19. (SBU) The IAEA has allocated Ghana funds for two assessment projects. The first is titled "Evaluating the Role of Nuclear Power in Future Options for Electricity Generation (GHA/0/011)." COMMENT: This project appears to correspond with Phase 1 in the IAEA,s phased, conditional approach for introduction of nuclear power, belying the public window-dressing that Ghana has already crossed the threshold into Phase 2. (See para 6 above.) Furthermore, it is not clear whether Ghana has sufficient funds from IAEA to fully execute this project. END COMMENT. The second project is entitled "Implementing the Borehole Disposal Concept (GHA/3/003)." This project explores the possibility of using a borehole to dispose of radioactive waste in a safe manner.

Motivations For Pursuing Nuclear Power

¶20. (SBU) Ghana,s stated justification for pursuing nuclear power is domestic energy security, and a desire to serve as a regional power generator and exporter. (NOTE: Ghana was historically a power exporter from the commissioning of the Akosombo Dam in 1965 until the 1990s. With the further expansion of the USAID-supported West Africa Power Pool, increased transmission capacity will further boost the prospected for Ghana serving as a regional exporter, assuming increased production in Ghana.) Framed in development terms, increased power production is needed for Ghana,s socio-economic development and goal to become a middle income country. Citing burgeoning

domestic demand and unmet regional power needs, GAEC officials conclude that nuclear power is more certain than the vagaries of imported gas from Nigeria via the West African Gas Pipeline. COMMENT: Missing from the public arguments on the economic need for nuclear power is the likelihood of cheap, domestically produced natural gas from Ghana,s 2007 new offshore oil discoveries. END COMMENT.

¶21. (SBU) The GAEC pragmatically recognizes that political considerations -- both domestic and international -- influence both the resources and

directions they receive, and will impact decisions on nuclear cooperation. Internationally, they noted that once they are locked into a nuclear cooperation relationship, it was difficult to change course; thus they are sensitive to securing an external long-term supplier who would not be subject to political vagaries. The GAEC also stressed that with the introduction of nuclear power they are seeking technology transfer and donor support for development of greater indigenous capacity and human resources. COMMENT: Local content and technology transfer are likely positive externalities of a successful nuclear program. However, the GAEC,s implication that these factors may be "conditions" or otherwise heavily weighted within the underlying economic rationale for pursuing a nuclear power program suggest institutional self-interest at play within the GAEC,s advocacy of nuclear power. END COMMENT.

Comment: Reality and Ambition - An Uncertain Gap

¶22. (SBU) It is difficult to assess the political and practical viability of Ghana,s stated goals to pursue nuclear energy. The Ghana Atomic Energy Commission is most likely not an impartial source - we cannot expect anything less than a positive assessment of nuclear technology and its benefits for Ghana from this analytically captured, group of nuclear technical specialists. While Ghana does have indigenous technical capability sufficient to serve as a host for external support, it is unclear what domestic political support and economic resources Ghana can muster to sustain its nuclear ambitions.

¶23. (SBU) The current political climate suggests that the (opposition) NDC party will control Ghana,s parliament in late January 2009. (The presidential election returns will be known by the end of December.) Thus, political support for the outgoing administration,s energy plans cannot be taken for granted. Given the IAEA,s own commitments to what appear to be a feasibility studies for nuclear power in Ghana, a reasonable conclusion is that the outgoing government,s announcement of a goal to achieve nuclear energy by 2018 was a political gesture to bolster the NPP,s claim to delivering modernization and prosperity to Ghana. After the current election

period political dust settles, a clearer view of the underlying national political appetite for nuclear power will be possible.

¶24. (SBU) Even assuming continued domestic political support for the pursuit of nuclear power in Ghana, the economic and financial rationality of any proposed nuclear power plant will depend entirely on the terms of external financing, and the costs of alternative sources of energy. Consistent with the current global economic down-turn, Ghana faces the usual macro-economic pressures associated with large budget deficits, and the increased costs of essential imported economic inputs - e.g. oil. While dropping oil prices will ease some of the pressure on Ghana,s current account, concerns regarding Ghana,s increasing levels of external indebtedness are likely to persist until Ghana,s domestic oil production comes on line in late 2010 or 2011. While expansion of domestic power production is a clear economic priority for Ghana, cheap domestically produced natural gas (and gas-fired power generation) may erase in the short-to-medium-term the economic arguments for a multi-billion dollar investment in nuclear power.

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